

Amendments to the Claims:

This listing of claims will replace all prior versions and listing of claims in the application.

Claims 1-34 are canceled without prejudice or disclaimer.

Claims 35-65 are new.

Listing of Claims:

35. (New) A method for transferring heat using first and second gas adsorbent materials, the second material being relatively thermally isolated from but in continuous gas communication with the first material, the method comprising the steps of:

(i) heating the first material so as to desorb a gas adsorbed onto the first material whereby the gas passes to and is adsorbed onto the second material; and

(ii) cooling the first material so that the gas is desorbed from the second material and passes therefrom to be re-adsorbed onto the first material;

whereby the second material is cooled by desorption therefrom of the gas.

36. (New) A method as claimed in claim 35 wherein in step (i) the first material is heated by heat transfer from a relatively hotter fluid stream.

37. (New) A method as claimed in claim 36 wherein the relatively hotter fluid stream is a waste process gas or liquid.

38. (New) A method as claimed in claim 35 wherein, whilst the first material is being heated, the second material is cooled relative to the first material by heat transfer with a cooling fluid stream.

39. (New) A method as claimed in claim 38 wherein the cooling fluid stream is a stream of ambient air.

40. (New) A method as claimed in claim 35 wherein in step (ii) the first material is cooled relative to the second material by heat transfer to ambient or by heat transfer with a cooling fluid stream.

41. (New) A method as claimed in claim 40 wherein the cooling fluid stream is a stream of ambient air.

42. (New) A method as claimed in claim 35 wherein in step (ii), whilst the second material is being cooled by desorption therefrom of the gas, the second material is used to cool another fluid.

43. (New) A method as claimed in claim 42 wherein the other fluid stream is a process gas or liquid requiring cooling.

44. (New) A method as claimed in claim 42 wherein, once desorption from the second material has reached completion, the second material is allowed to be slightly heated by heat transfer from the other fluid stream, just enough to restore its temperature to a level which corresponds with its temperature in step (i) prior to gas adsorption thereon.

45. (New) A method as claimed in claim 35 wherein the first gas adsorbent material has a different adsorptivity to the second gas adsorbent material.

46. (New) A method as claimed in claim 35 wherein the first gas adsorbent material is a different material to the second gas adsorbent material.

47. (New) A method as claimed in claim 35 wherein the first gas adsorbent material is a zeolite, the second gas adsorbent material is activated carbon.

48. (New) A method as claimed in claim 35 wherein the gas adsorbed onto the first and second materials is carbon dioxide.

49. (New) A method as claimed in claim 35 wherein the gas is pressurised relative to ambient pressure.

50. (New) A method as claimed in claim 49 wherein the gas is pressurised to 0.5 MPa.

51. (New) A method as claimed in claim 35 wherein, prior to commencing step (i), the gas and first and second materials are generally at ambient temperature.

52. (New) Heat transfer apparatus comprising a chamber having a first portion which contains a first adsorbent material and a second portion which contains a second adsorbent material, the apparatus characterised in that the portions are connected so as to always allow continuous gaseous communication therebetween and are relatively thermally isolated from each other.

53. (New) Apparatus as claimed in claim 52 wherein the first and second portions are joined by a section which is adapted to minimise conductive heat transfer between the first and second portions whilst allowing the continuous gaseous communication between the portions.

54. (New) Apparatus as claimed in claim 53 wherein the section is a conduit having a relatively smaller width than the width of the first and second chamber portions adjacent thereto.

55. (New) Apparatus as claimed in claim 52 wherein one or more heat transfer elements are arranged in each of the first and second chamber portions together with the first and second adsorbent materials.

56. (New) Apparatus as claimed in claim 55 wherein each heat transfer element comprises a metal wire mesh that enhances thermal communication between an exterior of the chamber portion and the adsorbent material therein and enhances the mass transfer rate of the gas through each of the first and second adsorbent materials.

57. (New) Apparatus as claimed in claim 52 wherein the first and second chamber portions are each adapted to be positioned midstream of a respective flow of fluid to transfer heat between the respective fluid and portion.

58. (New) Apparatus as claimed in claim 52 wherein the first and second materials are each packed into a respective portion of the chamber.

59. (New) Apparatus as claimed in claim 52 wherein the first gas adsorbent material is a different material to the second gas adsorbent material.

60. (New) A system for continuously transferring heat from a first fluid stream and for continuously cooling a second fluid stream, the system comprising first and second apparatus each able to be brought into thermal communication with the first and second fluid streams, wherein each apparatus comprises a chamber having separated first and second adsorbent materials, and each apparatus is operable in the following stages:

- (1) the first material is heated by thermal communication with the first fluid stream so as to desorb a gas adsorbed onto the first material whereby the gas passes to and is adsorbed onto the second material; and
- (2) the first material is cooled so that the gas is desorbed from the second material and passes therefrom to be re-adsorbed onto the first material, with the second material being cooled by desorption therefrom of the gas, and the second fluid stream being cooled by thermal communication with the second material;

the system being characterised in that:

- whilst the first apparatus is operated under stage (1) to heat the first material of the first apparatus using the first fluid stream, the second apparatus can be operated under stage (2) to cool the second fluid stream by desorption of the gas from the second material of the second apparatus; and then
- the first fluid stream can be directed to the second apparatus and operated under stage (1) of the second apparatus, and the second fluid stream can be directed to the first apparatus and operated under stage (2) of the first apparatus;
to thereby provide for continuous transfer of heat from the first fluid stream and continuous cooling of the second fluid stream.

61. (New) A system as claimed in claim 60 comprising a plurality of first apparatus and a plurality of second apparatus.

62. (New) A system as claimed in claim 28 wherein the first and second apparatus are operated in parallel.

63. (New) A system as claimed in claim 60 further comprising valving for selectively switching the flow of the first and second fluid streams respectively between the first and second apparatus and the second and first apparatus, to maintain a continuous transfer of heat from the first fluid stream and a continuous cooling of the second fluid stream.

64. (New) A system as claimed in claim 60 wherein each of the first and second apparatus include a chamber having a first portion which contains a first adsorbent material and a second portion which contains a second adsorbent material, the apparatus characterised in that the portions are connected so as to always allow continuous gaseous communication therebetween and are relatively thermally isolated from each other.

65. (New) A system as claimed in claim 60 wherein each of the first and second apparatus are operated using a method for transferring heat using first and second gas adsorbent materials, the second material being relatively thermally isolated from but in continuous gas communication with the first material, the method comprising the steps of:

(i) heating the first material so as to desorb a gas adsorbed onto the first material whereby the gas passes to and is adsorbed onto the second material; and

(ii) cooling the first material so that the gas is desorbed from the second material and passes therefrom to be re-adsorbed onto the first material;

whereby the second material is cooled by desorption therefrom of the gas.